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posure of six to eight minutes. Very thin, transparent sections require less time than thick or deeply-stained ones.

The pictures are, of course, negative, but they are none the less valuable for the purposes before named. If positive pictures are desired these are easily obtained, as the photographic paper is sufficiently transparent to admit of copying. For this purpose lamp-light is better than sunlight, and an exposure of one-half to one minute is sufficient. Both the negative pictures and the positive copies admit of further finish with pencil or color.

Full details of manipulation are furnished with each package of the Eastman paper. The operations which follow exposure are (1) softening of the paper in water; (2) development of the picture by means of potassium oxalate and ferrous sulphate; (3) washing in acidified water; (4) fixation through hyposulphite of sodium; (5) washing and drying.

SCIENTIFIC NEWS.

—In the November number of the AMERICAN NATURALIST Mr. J. F. James kindly calls my attention and that of the general public to what seems to be a slight put upon his work. A word of explanation seems to be due both to Mr. James and myself. The object of the paper entitled "Origin of the Indiana Flora" was simply to apply well-known facts with regard to the North American flora to the specific case of Indiana. In order to do this it seemed necessary to give an introduction containing an explanation of the general problem for those for whom the writing was intended,—a thing that would not have been necessary for the scientific public. My former assistant, Mr. Thomson, was asked to look up the literature of the subject and prepare as compact a statement as possible of the known facts. I suppose that he found Mr. James's paper useful, as being the most concise compilation of facts so well known as to have become general property. That due credit was not given to Mr. James for this assistance was a great oversight, but that it could not have been intentional appears in the very extracts that Mr. James has culled out. He is there mentioned by his full name as an authority for some statement or other. I am blameworthy for not more closely inspecting this part of the work, but, as the chief trouble was failure to give full credit to Mr. James, it is hereby done, with an expression of regret that the omission was not seen in time to remedy it.—*John M. Coulter.*

—The Imperial University of Japan has recently established a marine biological station at Misaki, a day's journey from Tokio, an account of which has recently been published by Professor Milsukuri in vol. i. of the *Journal of the College of Science* of the university. The building is of wood; the laboratory-room is forty-eight feet long by from twelve to eighteen in width, and affords space for about ten workers. Besides this there is a room for sorting specimens and another for library purposes, while the second story affords sleeping-rooms. Salt water runs to the tanks and aquaria in the laboratory. Misaki is favorably situated for biological investigation, and the catalogue of fauna outlined by Professor Mitsikuri is tantalizing. Foraminifera, Radiolaria, glass sponges (Hyalonema and Tetilla), corals, and Pennatulids, a Pentacrinus "two or three feet long," Chiton, Haliotis, Doliolum, pteropods and heteropods, Actinotrocha, Tornaria, Pilidium, etc., characterize the general facies of the locality when viewed from the zoological side.

—Dr. G. H. Sternberg, U. S. A., has just returned from Havana. He was sent by the U. S. Health Commission to examine the claims of the various methods reported by physicians in Rio Janeiro, Vera Cruz, and Havana for combating yellow fever by inoculation. The discovery of the supposed yellow-fever bacilli has been followed by attenuation cultures, after the method of Pasteur. Dr. Sternberg has brought with him culture series of these bacilli from all these localities, and will proceed to develop them and test their merits as preventives of this dread scourge of the tropics.

—Prof. Alfred Giard, of Lille, has been called to Paris as "maître de conférences à l'Ecole normale supérieure."

—Dr. O. S. Jensen, who had just published a valuable paper on "Spermagenesis in Mammals, Birds, and Batrachia," died in Christiania, September 14, 1887, aged forty years. He was a skilful anatomist.

—Professor Hugo Lojka, of Buda-Pest, a student of lichens, died September 7.

—In the death of Mr. Oscar Harger, which occurred at New Haven, November 6, of cerebral hemorrhage, science has lost an able and conscientious worker, whose labors are none the less important because they are not widely known. Born at Oxford, Conn., in 1843, his early years were spent upon a farm, where, while his educational facilities were very limited, he became imbued with that love of natural history to the study of which his life has been devoted. His attention was early directed to botany, a subject which he pursued with unabated zeal throughout life, and it was the success that attended his early efforts in this study that induced him, as he has told me, to prepare for college, which was accomplished largely without pecuniary aid. He graduated at Yale College in 1868 with high honors, the expenses of his course having been chiefly defrayed by his own exertions in mathematical calculations for life-insurance companies and for Professor Newton. The two following years were spent in natural history studies in Sheffield Scientific School with Professor Verrill and his most intimate friend, Prof. S. I. Smith. In 1870 he was appointed assistant in palæontology to Professor Marsh, a position he uninterruptedly held to his death.

His life for twenty years has been wholly that of a student and investigator, but the published works by which he is known to the scientific world are not numerous or extended, though important. His chief work was a "Report on the Marine Isopoda of New England and Adjacent Waters," published in 1880, but he also published not a few other papers in the *American Journal of Science*, and elsewhere, on isopods, myriapods, and a fossil spider (Arthrolycosis) from the Coal-Measures. The real work of his life, however, will never be appreciated save by those who knew him well. A patient and accurate observer, possessed of truly remarkable logical powers, and a man of very extensive and most accurate knowledge, the results of his eighteen years' work in vertebrate palæontology have been of great value, notwithstanding the fact that none of them have been published by him. In eight years' daily intimate association with him in the Yale College Museum, I cannot recall an instance where his matured opinions and statements were assailable; errors he made, of course, but they were fewer than I have ever known in any other person. Unfortunately, his opinions, though never gainsaid, were not always followed. To my personal knowledge, nearly or quite all the descriptive portion of Professor Marsh's work on the Dinocerata was written by him, and was published without change, save verbal ones. The descriptive portion of the Odontornithes was likewise his work, but this I cannot say from personal knowledge.

Born with unsound physique, his life has been a constant struggle with difficulties that a man with a less indomitable will would have found unconquerable; that he has lived for the past eight years has been a surprise to his physicians and friends. He was firm and pronounced in his opinions, but withal of a very modest and retiring disposition. The few intimate friends that knew him cherished and respected him in a remarkable degree. He was married in 1875 to Miss Jessie Craig, of New Haven, who survives him without children.—*S. W. Williston.*

—Ferdinand V. Hayden, M.D., Ph.D., the well-known geologist, died December 22 at his residence in Philadelphia, after an illness which had confined him to his room for over a year and a half.

He was born in Westfield, Mass., September 7, 1829, and at an early age emigrated to Ohio, and was graduated from Oberlin College in 1850. He afterwards studied medicine at the Albany

Medical College, taking his degree in 1853. He did not practise medicine, but in the spring of the year of his graduation visited the "Bad Lands" of Dakota on White River in the interest of Prof. James Hall, explored one of the remarkable ancient deposits of extinct animals, and returned with a large and valuable collection of fossil vertebrates. He spent the three following years in exploring the Upper Missouri, and his large collection of fossils was partly given to the Academy of Sciences in St. Louis and a part to the Academy in Philadelphia. These collections attracted the attention of the officers of the Smithsonian Institution, and he was appointed, at the suggestion of General J. A. Logan, geologist on the staff of Lieutenant G. K. Warren, of the Topographical Engineers, who was then making reconnoissance of the Northwest, and continued on duty till 1861, when he entered the war as a surgeon of volunteers. He was brevetted lieutenant-colonel for meritorious services at its close.

In 1865 he was elected Professor of Geology and Mineralogy in the University of Pennsylvania, and held that post until 1872, when he resigned on account of the increased labor in managing the survey. In the summer of 1866 he made another expedition to the Upper Missouri.

The United States geological survey of the Territories, under charge of Professor Hayden, was commenced in the spring of 1867 and continued until 1879. Seven annual reports of the survey have been published in 8vo, and eight volumes of the quarto final report. Three volumes of the 4to series are not yet published.

His reports of the exploration of the famous Yellowstone region in 1870 and 1871 induced Congress to set apart by law as a national park three thousand five hundred and seventy-five square miles of the public domain, containing within its limits most of the geysers, hot springs, and other wonders of that region.

The United States owes to Dr. Hayden the establishment of its Geological Survey. Those acquainted with the history of this great work can testify to the energy and perseverance which he expended in accomplishing it, qualities which were in a high degree inherent in Dr. Hayden's character. Dr. Hayden's influence was only second to that of Baird in securing for science the aid and recognition which it has received from the government of the United States. And at the period of his greatest success Hayden was always the same unpretentious and enthusiastic seeker for knowledge. He was singularly free from sordid motives, and he left the service of the government a poor man. His retirement was caused by an intrigue discreditable to all who participated in it. His removal from the position which he had won through so many years of toil, was influential in bringing on the disease to which he succumbed.

Dr. Hayden left a widow but no children.

—By the death of Prof. William Stebbins Barnard, on the 13th of November, in his thirty-ninth year, American Science has lost a biological investigator and teacher of unusual ability, training, and originality.

Dr. Barnard was born at Canton, Ill., on the 28th of February, 1849. After a year at the University of Michigan, he entered Cornell University at its opening in 1868. While a student he paid special attention to Natural History, and was selected by the late Prof. Chas. Fred. Hartt to assist in his expedition to Brazil. In that country Dr. Barnard made important explorations and collections, and some of his specimens are in the museum of Cornell University. After graduating in 1871, he spent two years under the best teachers in Germany, and on taking the degree of Ph.D. at Jena, in 1873, received from Haeckel a personal certificate that in his studies he had "shown the highest degree of excellence." Returning to Cornell, he made many observations and drawings of the Protozoa, on which group he gave courses of lectures at the University, at the Anderson School on Penikese Island, in the summer of 1874, and at the summer schools in Normal and Peoria, Ill., in 1875. From 1876 to 1878 he was professor of natural science in the Oskaloosa (Iowa) Normal School, and then for two years gave at Cornell University the instruction in entomology and invertebrate zoology during the absence of Prof. J. H. Comstock as United States entomologist. Under Professor Comstock's successor he became an assistant in the entomological division of the Bureau of Agriculture, and during the following five years made valuable observations upon destructive insects, and devised several appliances for spraying insecticides upon the cotton-worm and other forms; his apparatus and experiments are described in the department reports and bulletins, and were highly commended by the chief of the division.

During the last two years he was professor of natural history in Drake University, Des Moines, Iowa, whose faculty and students at his death adopted resolutions expressing their affection, esteem, and sense of irreparable loss.

Besides his contributions to the U. S. Entomological Reports, Dr. Barnard's publications were as follows:

1. "Observations on the Membral Musculation of *Simia satyrus* (orang) and the Comparative Myology of Man and the Apes." *Amer. Asso. Proc.*, August, 1875, pp. 30, two plates.

2. "Observations on the Development of *Didelphys virginiana*" (the opossum). *Ibid.*, pp. 2, one plate.

3. "Catalogue of the Invertebrates" (excepting insects) in Ward's natural science establishment, octavo, pp. 96, eight plates. Rochester, 1876.

4. "New Rhizopods," pp. 3, one plate. *Amer. Quar. Microscopical Journal*, 1879.

5. "Zoological Education." Read before the University Convocation, July 13, 1879. Report of the Regents of the University of the State of New York, 1879, pp. 529–532.

6. "Protoplasmic Dynamics." AMER. NATURALIST, April, 1880, pp. 10, five figures. Hundreds of accurate and beautiful drawings and diagrams, with notes and manuscripts equivalent to several large volumes, bear witness to his scientific spirit and industry, and indicate what he might have put in shape for publication but for imperfect health and an almost too faithful devotion to his duties as a teacher.

In 1874, Dr. Barnard married Miss Mary Nichols, sister-in-law of Prof. B. G. Wilder. A son inherits much of his father's general ability, artistic talent, and fondness for natural history.—*B. G. W.*

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Natural Science Association of Staten Island.—October 8, 1887.—Dr. A. L. Carroll and Mr. Arthur Hollick exhibited specimens of the material from an artesian well at Bachmann's brewery, Clifton, in which the recent alleged discoveries of gold, copper, and rubies were reported. The specimens, said to have come from the lowest depth (about nine hundred feet), were typical New York Island rock, being a mica-schist containing garnets, which were probably mistaken for rubies. In this connection it is of interest to note that Dr. N. L. Britton predicted the finding of this rock below and to the eastward of our serpentine, in case a sufficient depth was reached. (*Annals of the N. Y. Acad. of Sciences*, vol. ii., Nos. 5 and 6, April 4, 1881.) The greatest interest was, however, centred in a specimen of conglomerate, consisting of pieces of wood, mortar, and scraps of iron and brass cemented together with sesquioxide of iron. It was not stated whether specimens of this material were the ones analyzed, but if they were it would not be difficult to account for the finding of copper, iron, and perhaps other metals, as it is evidently the refuse of some metal-working establishment, and is of recent formation.

Mr. Hollick exhibited drawings of lemon-pits, which had germinated while inside the lemon. One had developed two imperfect *green* cotyledons, and had pushed its way for about three-quarters of an inch through the pulp of the fruit.

A skin-scraper and several arrow-heads, from Old Place, presented by Mr. L. W. Freeman, were shown. Also a skin of the spotted warbler (*Dendrœca maculosa*), obtained by Mr. R. H. Britton, at New Dorp, on May 7. The same species had been noted on May 15 in the neighborhood of Eltingville by Messrs. Wm. T. Davis and Arthur Hollick.